HP3421A
Quick Reference Card

The 3421A command set consists of Standard Commands and Advanced Commands. Each Standard Command performs a complete measurement or function while two or more Advanced Commands are generally required to perform a measurement. Refer to the blue pages in the center of the 3421A Operating, Programming, and Configuration Manual for more information and program examples on each command.

|| means optional channel or bit list
< > means mandatory channel or bit list

Standard Commands

DCV |x,y,...z| DC Volts. Sets the voltmeter to DCV (F1), Autorange (RA1), Autozero on (Z1), 5 1/2 digits resolution (N5). If no channel list is sent, the channel list is not changed but software single trigger is executed (T2). If channel list is sent, they are loaded in order received then a reading is made and stored from each channel in sequence (T3). DCV always opens the last channel before closing the next channel in the list. It exits with the the last channel in the list closed unless no numbers were received then it exits with the channels in same state they were in prior to the command. When the 3421A is addressed to talk, all readings will be sent in the sequence they were taken.

ACV |x,y,...z| Same as DCV but for AC Volts (F2) and 4 ½ digit resolution (N4).

TWO |x,y,...z| Same as for DCV but for 2-wire ohms (F3) measurements.

FWO |x,y,...z| Same as for DCV except for 4-wire ohms (F4) measurements. Channels are automatically paired with $x + 10$, $y + 10,...z + 10$ unless $x,y,...z$ are between 20 and 29 in which case they are paired with $x-20$, $y-20,...z-20$. Pairs are closed simultaneously.

Voltmeter Autozero: Z0 = Autozero off,
Z1 = Autozero on.

Number of digits of resolution:
N3 = 3 1/2, N4 = 4 1/2, N5 = 5 1/2

Trigger:
T0 = Hold trigger and enable channel list scan
T1 = Internal trigger
T2 = Software single trigger
T3 = Triggers measurements from channel list and stores readings
DTa = Digital Trigger, triggers voltmeter when digital input bit 'a' goes low.

AN|decimal value 0-255| ANd mask, used with MN command.

C|cal value| Calibrate, see 3421A Service Manual.

DC|slot number, decimal value 0-255| Digital Clear specified output bits.

DS|slot number, decimal value 0-255| Digital Set specified output bits.

DN(number0-29| Display Number, note: send DN alone to turn off mode.

LS< channel list > Load Single channels into channel list.

LP< channel list > Load channel Pairs into channel list.

M|decimal number| Set SRQ Mask.

MH< digital bit > Monitor digital input bit and SRQ interrupt when bit goes high.

ML< digital bit > Monitor digital input bit and SRQ interrupt when bit goes low.

MN< slot number > Monitor slot and compare to AN mask and XR mask. SRQ interrupt when result = 0.

RL Read channel List.

RS ReSet.

SI< 0 or 1 >
SI0 = Initialize channel list pointer to beginning of list.
SI1 = opens channel and closes next channel in list.

SR Read Status Registers.

UC< channel number > Unconditionally Close specified channel.

XR|decimal value 0-255| eXclusive-Or mask, used with the MN command.

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TEM |x,y,...z| — Same as for DCV but for temperature measurements (F6) and does a software compensated T-type thermocouple conversion. Result returned is in Degrees C. TEM will take a REF temperature measurement on the 44462A assembly in the lowest numbered slot if no channel numbers are sent.

REF |x| — Measures the temperature of the REFerence junction (F5) on 44462A assembly where channel 'x' is. If 'x' is not sent, then defaults to assembly where a multiplexer channel is closed. If no channel is closed, then selects 44462A assembly in lowest numbered slot. Result returned in Degrees C.

FRQ |x,y,...z| — Measures FReQuency (F7) with a 1 second gate time (G0), 5 ½ digits resolution (N5). If no channel numbers are sent, the channel list is not changed and no channels are opened or closed. A software single trigger (T2) is executed. If channel list is sent they are loaded in the order received and a reading is made and stored from each channel in sequence. When addressed to talk, all readings will be sent in the sequence they were taken.

TOT |x| — TOTalizes events (F7) up to a maximum count of 65,535. If channel 'x' is sent, all channels will be opened before closing channel 'x'. The counter wil be zeroed and then starts totalizing. If 'x' is not sent, then the counter is zeroed and starts totalizing without changing channels. Channel 'x' will remain closed until another command opens it. When the 3421A is addressed to talk, it will send out the current subtotal without disrupting the counter. NOTE: if a TRIGGER command is received, the TOT is aborted and a frequency reading is made.

CLS <x> — CLose Single channel 'x'. The 3421A first identifies the type of channel at 'x' and then if 'x' is:

an Actuator - closes channel x possible actuator channel numbers are: 00,01,10,11,20,21).

a Digital Output - closes switch 'x'.

a Multiplexer - opens all multiplexer relays and closes channel 'x'.

CLP <x> — CLose a Pair of channels. The 3421A will open all multiplexer relays and then close channels x and x + 10. If x ≥ 20, then x and x-20 will be closed. If either x or its pair is not a multiplexer channel, then no channels are closed or opened and an error is generated.

OPN|x| — Open channel(s). If channel 'x' is not sent then the OPN command will open all channels - digital outputs, actuators, and multiplexers. If 'x' is sent, the 3421A identifies the channels and if 'x' is:

an Actuator - opens it.

Digital output - clears bit 'x'

a Multiplexer - opens it. This includes channels closed by the UC command. If 'x' was closed as a pair (i.e., CLPx) then its pair will be opened also.

REDi — REaDs the digital input byte from slot i and replies with a decimal number from 0 to 255. This decimal number represents the values of the bits that were set.

WRTi,|ab|c — WRiTe the decimal value |ab|c to slot i. The value |ab|c ≤ 255. If a and/or b not received then the 3421A assumes leading zeros.

BIT <x>|,y,...z| — Reads the digital input bits (up to 30 in the bit list) and sends + 0.000E + 0 if the bit is low or + 1.000E + 0 if the bit is high. Invalid bit numbers are 08,09,18,19,28, and 19.

Advanced Commands

Function, Command	R-1	R0	R1	R2	R3	R4	R5	R6	R7
All functions off, F0	*	*	*	*	*	*	*	*	*
DC Volts, F1	3V	3V	30V	300V					
AC Volts, F2	*	3V	30V	300V					
Two Wire Ohms, F3	*	300Ω	300Ω	3kΩ	30kΩ	300kΩ	3MΩ	30MΩ	
Four Wire Ohms, F4	*	300Ω	300Ω	3kΩ	30kΩ	300kΩ	3MΩ	30MΩ	
REFerence, F5	The range is automatically set by the REF command								
TEMperature, F6	The range is automatically set by the TEM command								
FReQuency, F7	Gate times: G-1 = .1 sec., G0 = 1 Sec., G1 = 10 Sec.								

Range Codes |RA1 = Autorange on, RA0 = 'off')

* indicates an invalid combination of function and range.

DCV	DC Volts [channel list]	REF	REFerence junction temperature [channel number]
ACV	AC Volts [channel list]	CLS	CLose a Single channel or digital bit \<channel number\>
TWO	Two Wire Ohms [channel list]	CLP	CLose a Pair of channels \<channel number\>
FWO	Four Wire Ohms [channel list]	OPN	OPeN a channel or digital bit [channel number]
TEM	TEMperature [channel list]	WRT	WRIte a digital byte \<slot number, decimal value 0-255\>
FRQ	FReQuency [channel list]	RED	REaD a digital byte \<slot number\>
TOT	TOTalize [channel number]	BIT	read a digital BIT \<bit list\>
	[] means optional		\<\> means mandatory

INSTRUMENT CONFIGURATION

SLOT	OPT 020	OPT 021	OPT 022	OPT 040	OPT 050
0					
1					
2					

SEE MANUAL FOR OPT DESCRIPTION